Chapter III

BUILDING LONG SAULT: NEW ARRANGEMENTS AND TRADITIONAL PRACTICES

In constructing the Seaway, the Corps had to create workable arrangements not only with the St. Lawrence Seaway Development Corporation and the Power Authority of the State of New York, but also with the St. Lawrence Seaway Authority, the Hydro-Electric Power Commission of Ontario, the Federal Power Commission, the St. Lawrence Joint Board of Engineers, the New York Central Railroad, the New York State Department of Public Works, and the Mohawk Indians. Thus, in addition to its traditional concerns for designing, scheduling, contracting, and inspecting, the Engineers had to cope with a complex organizational environment. This chapter examines how the Corps worked out administrative arrangements for dealing with the other agencies having responsibility for the improvements in navigation and the power works. This chapter also examines how these procedures translated themselves into practice in the construction of Long Sault Canal which contained the two major American lock projects. The next chapter will treat how the Corps carried out the other improvements in navigation in this difficult environment.

Being only one of a number of agencies with interest in and responsibility for the Seaway, the history of the Corps' involvement in building Long Sault is in one sense very much a matter of how the Engineers coped with a complex organizational environment. It is an account of trying to follow standard practices and procedures in changeable circumstances in the glare of public attention. The Seaway attracted more general public notice, especially in the Great Lakes area, than many other civil works projects. While much of the television, newspaper, and magazine coverage was supportive of the project and the Corps' role, the Engineers nevertheless had to be attentive to public sentiment. This was especially true in the Massena area where lands were being condemned for the project. At the same time, the Seaway continued to run into political opposition. Opponents of the project looked for delays and increased costs in order to justify renewed attacks, and, although the Seaway Development Corporation bore the brunt of these attacks, the Corps was not spared.

In addition to the complex organizational situation, constant public attention, and politically-motivated scrutiny, the Corps also encountered problems typical of construction projects: changed conditions at worksites, defaults by contractors, bad weather, labor shortages, unavailable supplies, and the like. But the Engineers had long experience in coping with these kinds of problems. Indeed, their expertise in this regard contributed much to the completion of the Seaway on schedule despite fundamental changes in design,

scheduling, and contracting which led to tighter schedules and a greater sense of pressure.

The complexities of the project forced Corps officials to adhere strictly to standard design, schedule, contract, and inspection procedures; to deviate from them would have opened the possibility of further delay and increased costs. Use of those procedures also allowed the Engineers to be flexible in their dealings with the many other public and private agencies involved. That flexibility, particularly the ability not only to recognize but also to accommodate the interests of other groups, helped build good will and minimize confrontation. And confrontation was to be avoided since it resulted only in delay.

Work Begins

January 1955 saw the first bids advertised for the St. Lawrence Seaway project. And, as the April groundbreaking ceremonies approached, the Corps and the St. Lawrence Seaway Development Corporation refined their administrative procedures and began working up final schedules, designs, and cost estimates. Meanwhile, the preliminary work had to be carried out: the acquisition of land and the relocation of people, roads, railroads, and power lines. Once these tasks were completed, work could begin on the canal and locks in Long Sault. This early work, however, was disrupted by two changes that caused strains on the working relationship between the Engineers and the Corporation which resulted in further changes in their organizational arrangements.

The first of these changes was the insistence of the Power Authority of the State of New York and the Hydro-Electric Power Commission of Ontario that the power pool be raised earlier than originally planned. This change required substantial revisions in timetables for the completion of the Long Sault Canal and its two locks at Grass River and Robinson Bay. The second change resulted from the New York Central Railroad's decision to abandon its branch to Ottawa which crossed the St. Lawrence River near the site of the Seaway.

Neither the Corporation nor the Corps anticipated these changes as they set to work in late 1954. As mentioned earlier, the Buffalo District office became the key point of contact between the Corps and the Corporation. The Corporation set up an office in Buffalo which was headed by Deputy Administrator Martin Oettershagen. The Buffalo District Engineer, Colonel Loren W. Olmstead, had been assigned responsibility for the Corps' contracting authority. He and his staff of 140 were responsible for engineering design work, preparation of contract plans and specifications, administration of bids and contracts, project scheduling, and construction superintendence. The staff was organized along functional lines—engineering (the largest), legal, real estate, relocation, coordination, etc. The coordination division had been created to keep the Corporation apprised of the Corps' work, as well as to maintain relations with the other agencies involved. In addition to the Buffalo staff, the District also employed another 100 people at the worksites to provide supervision, inspection, and support services. Oettershagen and his staff of

Colonel Loren W. Olmstead, Buffalo District Engineer (1954-1959).

five engineers were responsible for engineering review and general supervision to assure that the Corporation met its responsibilities while the Seaway was under construction.[1]

Project operations were divided into major worksites. Each of these was further divided into work "features." Thus, the Long Sault worksite was divided into such features as the Robinson Bay and Grass River locks, channels, roads, levees, relocations, etc.[2] Initially, there were three major worksites: Long Sault, Thousand Islands, and Cornwall Island. But as detailed engineering design work and scheduling began, Colonel Olmstead and his staff added a fourth worksite designated as "general purpose facilities and equipment." This site included those necessary features of the project that did not easily fit into one of the other three: buildings, grounds, utilities, permanent operating facilities and equipment, and navigation aids.[3]

The design, scheduling, and construction of the project depended on the ability of the Corporation's deputy administrator and the Corp's Buffalo District Engineer to create workable administrative procedures. This was not an easy task since both Oettershagen and Olmstead were engaged in an unfamiliar relationship. It took the first half of 1955 before they created an organizational relationship that worked.

At first, Olmstead and Oettershagen planned on monthly meetings to review the progress of design, scheduling, contracting, excavations, and construction.[4] Informal weekly conferences, however, soon became necessary.

Corps and Corporation personnel were regular participants, with representatives from New York's Power Authority and the New York Central Railroad, for example, in attendance when appropriate. These informal meetings provided the give-and-take Oettershagen and Olmstead thought necessary to reduce misunderstandings and allow both sides to better grasp the other's most pressing concerns.[5]

The weekly meetings were successful. They were forums for discussing issues as well as deadlines for the numerous small tasks that needed to be completed on time if the entire project was to meet its schedule. They were helpful in plotting courses through bureaucratic mazes to gain permits and rights of entry. And they allowed Corporation personnel to get a better understanding of how the Corps dealt with contractors, providing in the process a means for the Corporation to make suggestions to contractors.[6]

These informal meetings were, however, not foolproof. Misunderstandings continued to occur. The Corps believed that the Corporation did not give enough prominence to the Engineers' role in the project. A belief supported, at times, by the fact that the Corps was not informed of VIP tours, something that particularly irked the District Engineer.[7]

Nevertheless, the informal meetings proved their usefulness in the face of unanticipated events which required substantial changes in plans. The first of several "shocks" was a major alteration in the projected completion date of the Seaway. Indeed, the beginnings of the protracted discussions of this critical change had first alerted both Olmstead and Oettershagen to the deficiencies in their administrative machinery which led to the institution of the weekly meetings.

In November 1954 the Power Authority of the State of New York and its consulting construction engineers formally raised questions about the Corps' proposed construction schedule for the navigation works. The new locks had to be ready for traffic at the same time that the power pool would flood the existing 14-foot Canadian locks that St. Lawrence shipping depended on. Both the American and the Canadian power companies were anxious to begin operation of their hydroelectric works. The New York Power Authority, in fact, planned to raise the power pool on 1 July 1958. But the Engineers' construction schedule projected that the Long Sault Canal and its two locks would not be ready for service until 1 September.[8]

The Power Authority argued that the terms of its bond issue required that power be generated by the 1 July date, making an already tight engineering schedule even tighter. Indeed, the 1 September 1958 date already represented a change from original Corps planning. At first, the Corps' schedules anticipated completing the navigation improvements by the beginning of the spring 1959 shipping season. Thus, by accepting 1 September 1958, the Corps had already acquiesced in what it saw as an accelerated schedule to meet the power company's desire to speedily bring the power works on line.[9]

The Corps took the position that the July date would increase costs and "jeopardize good construction practices," since contractors would have to pour concrete during the winter season (November, December, January, and February) 1956. The issue flamed even more when the Corps and the Cor-

poration insisted that if the date were moved up, the Power Authority must pay any additional costs.[10]

By the spring of 1955 it was clear that the impasse had to be overcome. Buffalo was at full strength with work proceeding on designs, contracts, advertisements, and schedules. To come to a resolution, the Power Authority suggested that the Corps reduce the contingency periods allowed on the canal and lock contracts, which were to be finished 1 April 1958, with contingencies anticipating a 1 September 1958 date. Buffalo rejected this proposed solution, arguing that the "experience of this office is that all construction jobs are plagued by strikes, abnormal weather, necessary modifications in many cases, unforeseen construction conditions which invariably result in extensions of time to the contractor and delayed completion of contract work . . . For a project as large and as complex, and with the major soil problems involved on the St. Lawrence Seaway . . . [several months for contingencies] is neither abnormal nor excessive." But in the face of the power entities' adamancy, General Robinson accepted the PASNY's argument, with the proviso that if costs rose later because of the accelerated work schedule, the Corps would come back to the agency to negotiate further payment.[11]

The compromise put pressure on the Buffalo offices. While the basic schedules did not need to be revised or reworked, Olmstead and Oettershagen would have to ensure that contractors remained on schedule. The need for such oversight to meet the new 1 July 1958 deadline made the frequent informal meetings between Corps and Corporation officials in Buffalo essential.

The weekly meetings also helped meet deadlines in other ways. They eased the handling of the complex issues raised in the acquisition of property for the project. New York's Power Authority, responsible for acquiring much of the land, relied on the New York Department of Public works for most of the detailed work involved in title research, condemnation hearings, and negotiations with land holders. But the Corporation and the Engineers kept a close watch on the process. A speedy and orderly taking of land could forestall price increases, while mishandling land acquisitions could create costly and time-consuming legal questions as well as serious public relations problems.

Land condemnation was one area where the Seaway engendered real local hostility. Both of the state agencies heightened local apprehension by issuing vague statements about what lands would be needed for the project. And Robert Moses, the Power Authority chairman, made matters worse when he discussed the recreational benefits to be gained by the project. Farmers who stood to lose property objected to the taking of their land for such frivolous purposes.[12]

The complex interrelationships among the Corps, the Corporation, the New York Power Authority and the New York Department of Public Works lent themselves to misunderstandings. In the early stages of planning for the project the New York authorities had assumed responsibility for acquiring land in return for the Corps' designing dikes and relocating roads, bridges, railroad track, and power lines. This was a logical division of tasks, since the power project would take more land for flooding the power pool than the Corps would have to condemn for navigation improvements.

While the Corps cooperated with the Power Authority and the Department of Public Works in acquiring land for the project, the Buffalo District's real estate branch occasionally hastened condemnation proceedings. Buffalo District and Corporation officials worried about delaying over a drawn-out dispute over land. The Corps could go to court for condemnation hearings and obtain special writs permitting entry to land not yet finally conveyed to the Power Authority and the Corporation, but these procedures consumed valuable time. In most instances, the Corp's responsibility for relocation of roads, railroad track, and power lines necessitated their own negotiations with property holders. The Corps, however, kept New York authorities informed when it took such actions. For example, Buffalo's intervention prevented a delay on the construction of a new highway and railroad between the Raquette and Grass rivers. In that case, the proposed right-of-way cut one farm in half, preventing the movement of livestock from one side of the farm to the other. In the face of the owner's threat of legal action and unfavorable press coverage, Robert O. Scribner, the head of the Buffalo District's real estate branch, negotiated a settlement whereby the Seaway Development Corporation paid for the construction of a cattle "pass" under the road and the railroad tracks.[13]

Such solutions, however, were not always so easily arrived at. Real estate dealings with private individuals were, in some respects, simpler than negotiating with corporations and public entities. To be sure, the latter were apt to get less public sympathy than individuals in a land dispute with the Power Authority, but such disputes with large corporations, for example, the Reynolds Aluminum Company, were extremely time consuming and frustrating. And because such companies were bureaucratic, even out-of-court negotiations seemed to the Corps to take longer than necessary.[14]

Unfavorable public opinion and vexatious delays, however, could not always be avoided. This was particularly true of the dispute with the Mohawk Indians of the St. Regis Reservation. The Buffalo District feared that the dispute could delay the project, raise its cost, and bring negative publicity. The reservation extended into the south channel between Cornwall Island and the United States mainland, where the Corps planned to dredge. The reserve also included land needed for the approaches to a bridge connecting the mainland and Cornwall Island and for the eastern tip of the proposed Long Sault Canal. Tribal leaders adamantly rejected as inadequate the money offered for their lands. They also feared that placing dredged material in the river near their reservation would damage fishing and a beach.

This controversy raised three distinct problems. First, the area in dispute was pivotal to the timely opening of the navigation works to their full 27-foot depth. The work in the Cornwall Island south channel was to widen as well as deepen the channel, a project necessary to allow safe passage into and out of the proposed canal. The dispute with the Indians would delay removal of a low bridge over the channel and the construction of a new high-level bridge. Removal of the older bridge was necessary to allow ships through the newly widened and deepened channel. Without a new high-level bridge, auto and truck traffic to Canada would be disrupted.

Second, the reservation's legal status was such that ordinary condemnation hearings could not be heard in the state courts. The tribe held its land by treaty with the United States government and could only be sued in the federal courts. Corps officials thought that the federal courts would be less sympathetic to the project than the state courts. Moreover, the real estate branch thought that litigation in the federal courts would take longer than the standard state condemnation procedures.

The third problem, related in large part to the second, was adverse publicity. A prolonged controversy could shape up in the press as the Indian David facing down the combined Goliaths of the Corps of Engineers and the St. Lawrence Seaway Development Corporation.

The stakes were high, therefore, when Robert Scribner began discussions with Mohawk representatives late in 1955. The negotiations were complicated and protracted and involved disputes within the tribe and within the Corps. It was not until January 1957 that a mutually agreeable deal was reached. In essence, the discussions revolved around 86 acres, an area referred to as the upper land on Raquette Point. The area was east of the proposed canal, at the eastern end of the dredging that was to be done in the Cornwall Island south channel.[15]

The January 1957 understanding came none too soon—bids on the scheduled work for the area were due to be opened on 22 January 1957. The land was acquired and the work could begin on time, but Scribner often had to go back to discuss the project with tribal leaders.[16]

Relocating Roads, Rails, and Power Lines

The real estate branch was only one of the offices in the Buffalo District kept busy in the first year of the Seaway project. The relocation of roads, bridges, railroad tracks, and power lines, for which the Corps bore full responsibility, was one of the most important tasks of the first year or so of Seaway construction. Relocation of roads and power lines was often necessary to ensure that construction equipment could get to worksites and operate once there. Some of the relocations were fairly routine affairs, while others were highly complex and involved changes in plans. Such changes significantly affected design work and scheduling.

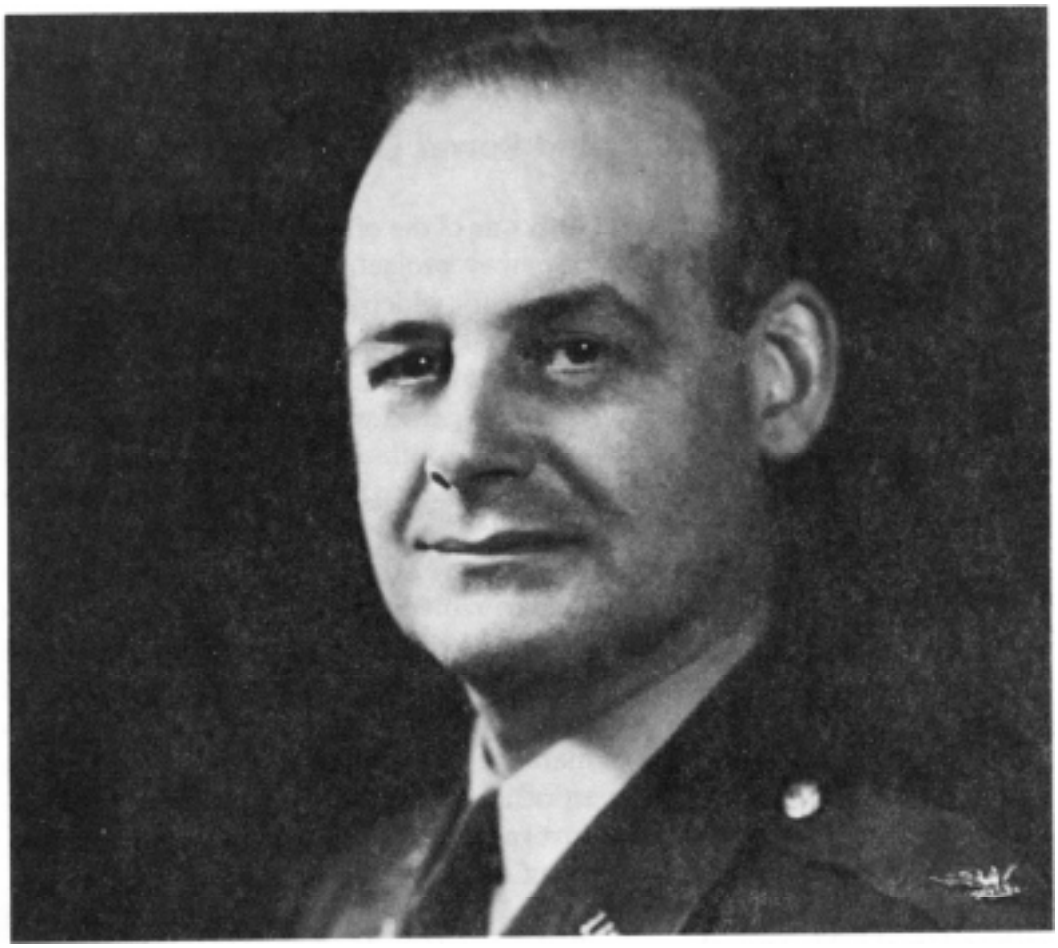
In one respect, the Americans had an easier time with relocations than the Canadians. Relocation in Canada involved entire communities. Lands taken for the project on the American side did not include highly populated areas. In contrast, on the Canadian side, the project involved the inundation of eight communities with a population of about 6,500 people. Canada also would have to move 40 miles of mainline railroad track and 35 miles of the country's busiest highway. As part of the effort to accommodate those displaced by the project, the Ottawa government built two new towns and relocated many of the buildings from one of the towns to be flooded.[17]

American relocation work centered on moving power lines, roads, and railroad tracks. No townships or villages were involved. This is not to say, however, that relocation projects were free of complications; quite the contrary.

Relocation work drew intense public attention. Plans for roads on Cornwall Island raised the ire of the local Catholic bishop. He objected to dividing a parish in two. The owners of the Cornwall International Bridge Company, Ltd., objected to the Pollys Gut bridge since it would allow traffic to circumvent their facility. The general public was interested in the debate because of the need for a link between the communities of Massena in New York and Cornwall in Ontario. Workers from both sides of the border crossed the border daily for work on the other side.[18]

Much of the work, however, turned out to be fairly routine. The Corps focused initially on quickly executing changes in road and power lines. The highway work was essential because many of the new roadways were to serve excavation and construction contractors. In places, the Engineers built temporary roadways to ease access to major sites, although contractors had to build their own roads within their worksites. The power lines had to be moved quickly to serve the electrical needs of the contractors.

In building the new roads, the Corps had to work closely with state highway officials, as well as elected representatives of the county and town governments in the area. Moreover, some of the roads the Seaway Corporation and the Corps were to build were technically for New York's Power Authority. A major artery across Bamhart Island, for example, particularly concerned PASNY. The roadway was to connect the powerhouse on the east-



Colonel Paul D. Berrigan, North Central Division Engineer

ern end of the island to the Long Sault Dam at the western end. It also was to link up with a road coming from the mainland, near where the Power Authority was building its permanent administration building for the power project.

The Seaway Corporation was to build PASNY's roads as part of the agreement assigning the Power Authority responsibility for acquiring necessary lands for the projects while the Corporation took responsibility for relocations. In carrying out this assignment, the Corps had to work closely with the New York State Department of Public Works which had ultimate responsibility for roads in the area. Eventually, the roads built by the Corps were to be turned over to the state for maintenance, and New York officials objected to some of the construction plans. They insisted on roads able to withstand the heavy construction traffic and the rigors of northern New York winters. Corps designers thought New York plans unnecessarily costly, but deferred to state officials on the issue. The state, after all, would have to maintain the roads.[19]

Bureaucratic considerations also influenced that course of action. Writing to the new Division Engineer, Colonel Paul D. Berrigan, Olmstead observed, "that acquiescing to the desires of the agencies of the State of New York will make for better relationships where further negotiations are required."[20]

Relocating power lines was as important as road work to the early stages of the project. Contractors needed electricity for their excavation and construction projects. In relocating power lines, the Engineers were involved in more complex relationships than in the road work. They needed to negotiate with the Federal Power Commission, as well as with New York State officials and Canadian power agencies. The Corps also had to deal with private interests, especially the Aluminum Company of America. That company obtained most of the power for its Massena plant from the Hydro-Electric Power Commission of Ontario, which generated it at facilities in Quebec. In the United States, the St. Lawrence River Power Company, an ALCOA subsidiary, owned the lines. The Power Authority of the State of New York and HEPCO were to bear the costs of relocating lines, except where they crossed Long Sault Canal. Those expenses were to be the responsibility of the St. Lawrence Seaway Development Corporation.[21]

While the Corps was responsible for contracting for the power-line work, the Seaway Corporation and PASNY had to work out the sharing of the costs for the projects. That cost-sharing agreement, however, took over seven months of negotiations. The seeming impasse between the power company and the Corporation was broken by an anxious General Robinson, who as Deputy Chief of Engineers for Construction also chaired the U.S. section of the St. Lawrence River Joint Board of Engineers. In that latter capacity, he forged a compromise acceptable to both sides. Again, Corps personnel displayed flexibility in dealing with the other agencies with responsibility for aspects of the Seaway project.[22]

While the Buffalo District's design and engineering staffs were busy with relocating highways and power lines, District Engineer Olmstead and Deputy Administrator Oettershagen increasingly devoted themselves to resolving problems which developed in planning the Pollys Gut bridge. Of the

issues dealt with in the first year of the project, only those dealing with the plans for that bridge equalled the controversy over raising the power pool. The bridge, originally designed to carry both motor and rail traffic, was central to both the timing of dredging work south of Cornwall Island and the construction of the Grass River Lock in the Long Sault Canal.

The original Seaway plans called for relocating the New York Central's line across Cornwall Island. The rail line, which terminated in Ottawa, had to be moved because its bridge, the Roosevelt Bridge, crossed the critical south channel, which, when fully dredged, would feed directly into the Long Sault Canal. The Roosevelt Bridge had to be eliminated. It was too low for ships to pass under, and its pilings interfered with plans to widen the channel. And, since railroad grades had to be very gradual, a new bridge was impractical in that reach. The plans, therefore, eliminated the railroad bridge over the south Cornwall Island channel and rerouted the rail line on the New York mainland in a westward "loop." This rerouting called for the railroad to cross the Grass River, then cross the proposed Grass River Lock over swing bridges to be built at either end of the lock. The two swing bridges were necessary to ensure that neither rail nor ship traffic would be interrupted. Ships could move into either end of the lock while rail traffic moved over the swing bridge at the other end. Once over the lock, the relocated rail line would parallel the new East-West highway, crossing the south channel of the St. Lawrence River on a proposed dual highway-railroad bridge over the Pollys Gut reach of the river. This part of the St. Lawrence would not be dredged. Once across the river onto Cornwall Island, the new rail line would link up with the old tracks and proceed across the existing railroad bridge over the north channel of the St. Lawrence to the Ontario mainland.[23]

Much engineering, design, scheduling, and contract preparation proceeded on the many aspects of the "loop" during 1955 and into 1956 even though the plans were based on the 1942 report. With the exception of the excavation and construction of Long Sault Canal and its two locks, the "loop" was perhaps the most complex part of the American Seaway project plans. It required contracts for the removal of the Roosevelt Bridge, which crossed the international boundary and thus complicated matters. Dismantling the bridge and abandoning its highway and rail approaches required Canadian permission, as did plans for the new construction at Pollys Gut. American agencies and contractors needed Canadian approval to navigate vessels in boundary waters and to operate machinery in Canadian territory. The United States requested the waiver of import duties on material needed for the project and the Canadian government's acceptance of the jurisdiction of American labor laws in contracts for work to be performed across the border.[24] These and related diplomatic issues had to be resolved before final design work could be completed. Discussion on the issues, however, was eased by the fact that the St. Lawrence Seaway Development Corporation and the St. Lawrence Seaway Authority agreed in November 1955 that it was to be a joint project.[25]

The interests of the Cornwall International Bridge Company, Ltd., however, complicated these Canadian-American discussions. The private company had long-term lease arrangements giving it the right to operate and

maintain the roadway and easements over the north and south channel bridges, as well as the highway across Cornwall Island. The bridge company feared that it would suffer serious losses because of the plans to "loop" the highway and railroad on the mainland, thereby causing the abandonment of the cross-island highway and the loss of toll and custom facilities that the company had built and operated for Canada. The Corporation and the Corps worried that litigation—possibly lasting several years—over the issue could complicate planning for the new bridge over Pollys Gut. It also could delay removal of the Roosevelt Bridge, and that could put the entire project off schedule.[26] The bridge company eventually received acceptable compensation; its actions caused no real delays.

A delay, however, did occur in removing the Roosevelt Bridge pilings. The blame for that delay, which pushed back completion of the 27-foot navigation channel beyond 1 July 1958, rested with the New York Central Railroad, the Corps, and the Corporation. Both of the latter were blind to the railroad's interests. From the 1942 report onward, the Corps' planning had simply assumed that the New York Central would want to relocate its tracks to keep open its line to Ottawa. But by 1954, the railroad had begun to question those assumptions and raised those questions in joint meetings. Neither the Corps nor the Corporation picked up on these hints, and instead pushed ahead with planning. Ultimately, the railroad company decided to abandon its rail service on the Ottawa branch.[27]

The Engineers' and the Corporation's misreading of the railroad's intentions is explainable in terms of a failure to contemplate the "unthinkable." As 1955 passed, contracts were awarded and work was begun on major sections of the Seaway project, and both the Corps and the Corporation found it inconceivable that the New York Central would abandon its service to Ottawa. Olmstead and Oettershagen knew that abandonment would require them to make major changes in design, cancel contracts, and schedule new work projects. Thus, in July 1956, when the railroad announced its intention to abandon its Ottawa service, the announcement came as a "bombshell."[28]

The New York Central's decision resulted as much from railroads' general inability to compete effectively with trucks in the early 1950s as from the anticipated costs of relocation. The railroad held options on land in the area, property which had risen markedly in value because of the expected location of new industry once the Seaway opened. And the railroad admitted that it was making a profit on the exclusively freight traffic carried on its Ottawa branch. But future profits were less certain. The new heavy-duty roads to be built in the vicinity of the Seaway meant greater truck competition in a region of anticipated business growth.[29]

Corps and Corporation officials had not taken the New York Central's talk of abandonment seriously, in large part because they had thought that the Interstate Commerce Commission (ICC) would never approve the railroad's request. Moreover, there had been persuasive political reasons for not abandoning the railroad. A proposal to give up service, Castle had calculated, would have brought about a storm of political opposition on Cornwall Island and in the mainland town of Cornwall. Town officials were still angered by the fact that a highway to be flooded for the power pool had been rerouted around

Cornwall, making access to the town less convenient than before. As Arthur J. Walters, chief of Buffalo District's legal branch, had observed, "for these reasons it is felt that New York Central could not abandon its rail line without diplomatic help from the Saint Lawrence Seaway Development Corporation." Such help, the attorney knew, the Corporation would not give.[30]

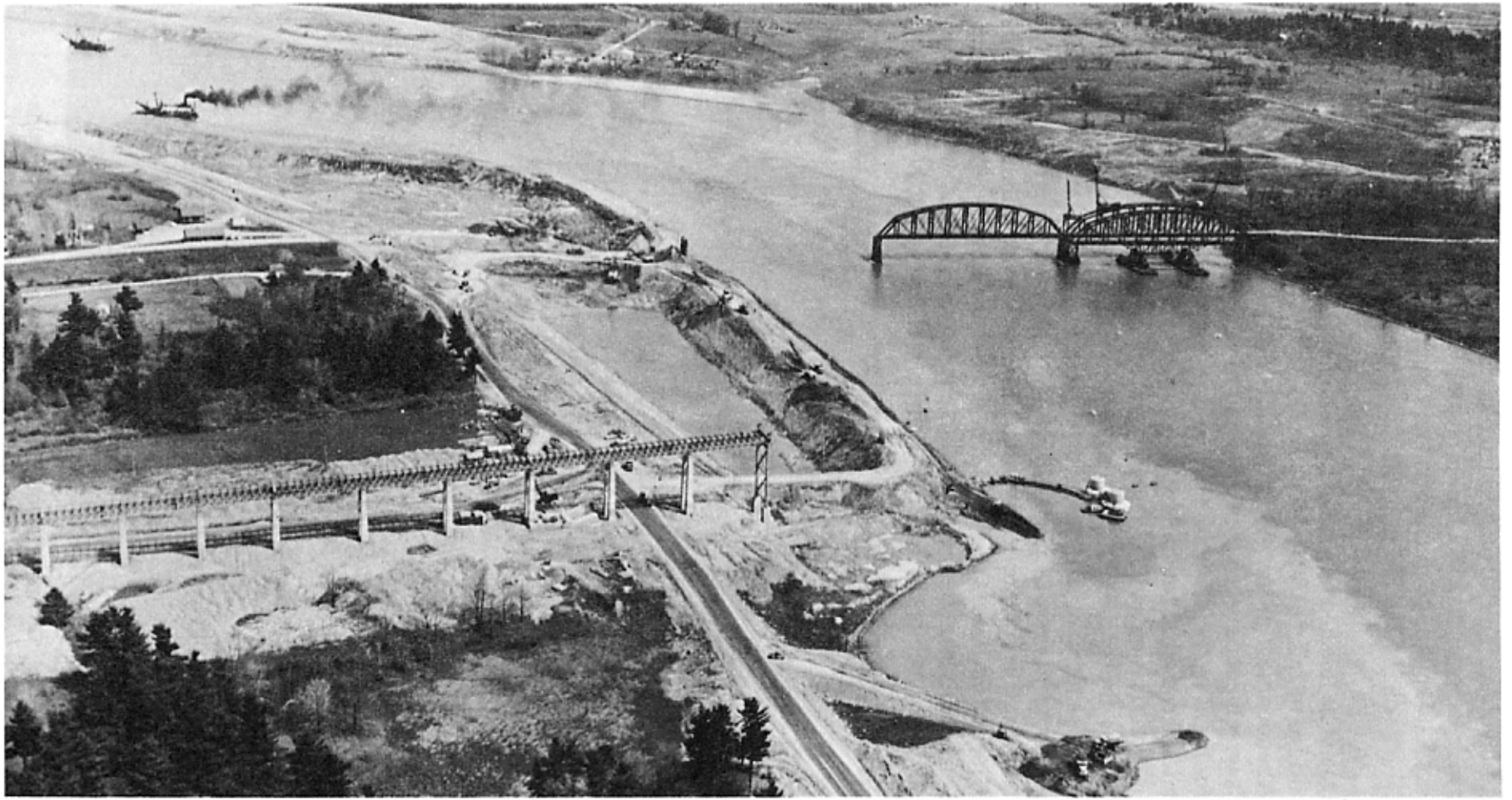
The railroad, however, had the upper hand. New York Central officials knew how critical timing was to the Seaway. They were aware of the increased pressure on the Corps and the Corporation stemming from the setting of an earlier date for flooding the power pool. They knew that their abandonment decision might end up in lengthy ICC hearings and perhaps in protracted appeals in the courts. And they knew that neither the Corps nor the Corporation could afford to go through that lengthy process as it opened up the possibility of truly extensive and costly delays. When the railroad finally decided on abandonment, there was little the Corporation or the Corps could do about it.

Within a day of the railroad's decision, Canadian and American Seaway officials began meeting with representatives of the Corps. Plans were changed. The "loop" was abandoned, and a decision to substitute a high-suspension highway bridge over the south Cornwall channel and improve the highway across the island was made. Close Canadian-American coordination was essential in all aspects of the suspension bridge project, which both countries agreed should be completed by 1 April 1958. The bridge was to cross the international boundary, but dividing the work on the bridge to allow each country responsibility for construction on its side of the border was impractical. Instead the Seaway Authority, the Seaway Development Corporation, and the Corps decided to assign work for the substructure of the bridge to Canada and the superstructure to the United States. The Seaway Authority and the Corporation were to obtain the necessary clearances from their respective foreign offices so that Canadian contractors could work on the American side of the border and American contractors could work on the Canadian side.

To avoid labor problems that could turn into political disputes in each country, the meeting recommended that the Canadians use American subcontractors on the United States side of the river. Similarly the Americans would use Canadian subcontractors on Canada's side of the boundary. Other measures discussed dealt with speeding up planning and detailing specifications to contractors.[31]

The Corps and the Seaway Corporation also had to clear up details concerning the initial "loop" plan. Contracts had to be cancelled on the swing bridges over the Grass River Lock, as well as for projected work on bridges over the Grass and Raquette rivers. The unfinished portion of the East-West highway was downgraded from heavy-duty road to minimum standards, since it was no longer to be a major artery between the United States and Canada.[32]

All of these changes required budget alterations. Costs of the new bridge were shifted from the Long Sault Canal worksite accounts to those for Cornwall Island. More important, however, than the accounting changes were



The partially removed Roosevelt Bridge, May 1958. Its north span rests on temporary piers. Also shown is the excavation on Cornwall Island and the partially built high-level bridge.

the losses involved. The "loop" design planning costs of $328,000 had been almost twice the original $182,000 projected. The Seaway Corporation also had to pay $2.4 million to the railroad and bridge companies to acquire their interests in the abandoned property. Finally, both the Corps and the Corporation had to make contingency plans to move traffic across the channel should the bridge not be finished on time. Approximately $400,000 was allotted for a ponton bridge or ferry service.[33]

Abandonment of the "loop" and the Pollys Gut bridge also led to a sharp disagreement between the Corps and the Corporation. In defending its budget for fiscal year 1957 before the House Appropriations Committee, the Corporation faced criticism that its budget was too high. Castle worked hard to maintain good relations with Congress, and, after a review, he cut the Corps' budget across the board. The Corps took strong exception to these cuts because they reduced expenditures for engineering, design; supervision, and inspection for fiscal years 1957 and 1958. The Corps felt the cuts were risky as they involved quality control expenditures. Major General Charles G. Holle, Acting Chief of Engineers, believed that neither the Buffalo District nor the North Central Division had been adequately consulted about the reductions. And from the perspective of the Chiefs office, Holle wanted to be assured that

Major General Charles G. Holle, Deputy Chief of Engineers for Construction (1955-1956); Special Assistant to the Chief of Engineers (1956-1958).

the Corporation put "on record" justifications for these reductions. In this way, the Corps could defend its reputation should there be future criticism of works the Corps believed had needed more attention than that allowed by the Corporation's reduced budget allotment.[34]

Perhaps the most important effect of the changes in plans, however, was to increase the sense of pressure over deadlines. The abandonment of the loop plans came just 24 months before the Seaway was to open, which did not allow much time to complete the new suspension bridge. Yet the increased pressure pulled the Americans and Canadians closer together as they cooperated well in dividing up the work for the new bridge.[35]

Thus, the Corps worked on many fronts during 1955 and 1956. Personnel in the Buffalo District had faced everything from fairly trivial issues, such as the location of observation points for tourists, to truly monumental issues such as those having to do with the raising of the power pool and the relocation of the New York Central Railroad. That same period, however, also brought satisfaction as work began on the major features of the American part of the project: the Long Sault Canal and the two locks located within its ten miles.

Design and Construction

Construction of the Long Sault Canal, with its two locks, involved the largest number of Corps administered contracts; its excavation and construction also required the greatest number of workers. The canal and lock designs were based on those included in the 1942 report prepared by the Corps. Many canal features were, of necessity, redesigned as project planning got underway and new conditions, changing costs, and the need to work closely with the Power Authority of the State of New York and the St. Lawrence River Joint Board of Engineers had to be taken into account.

Many aspects of the project involved routine excavation and construction, tasks long familiar to the Corps. But the Engineers' long experience had taught them that on a major project of such complexity the routine could not always be expected. And indeed the approval process alone lent itself to redesign or at least refinement of designs of fairly standard features. This was to be expected, more or less a natural byproduct of a system requiring successive bureaucratic approvals through the chain of command. But it was the addition of Corporation oversight and the need to coordinate parts of the project with PASNY that perhaps led to more revisions in designs than was typical of Corps projects. As a result, when difficulties arose after the project was underway, the Corps, as discussed earlier, insisted on using its standard practices in regard to scheduling and contracting in order to avoid further delay.[36]

Plans for the Long Sault Canal differed only "in matters of detail" from those found in the Corps' 1942 report. In the summer of 1954, as we have seen, the Buffalo District began work on design memoranda for the Seaway project. The ten-mile Long Sault Canal received the most attention. Corps planners saw the canal project as being made up of four major components. The critical first component was the power pool and its related dikes. Although

these dikes were primarily for power, they affected navigation and had to be constructed to suit the needs of both. The locks at Robinson Bay and Grass River each made up another component, and the fourth part was the intermediate pool between the locks.[37]

The first step in designing Long Sault Canal was to conduct field studies. To provide satisfactory guides for construction, Buffalo established a system of stations along the centerline and abreast the canal. The six stations alongside the canal were designed to remain after the power pool was raised and the canal filled and were positioned for the convenience of contractors on the major worksites.[38]

The field studies included geological and soil studies which were conducted by the Buffalo District in the fall of 1954. These analyses built upon the work done for the Corps' 1942 report. Between 1940 and 1942, the Corps had obtained subsurface information by drilling and testing core samples. To determine the depth of soft deposits they probed into the soft overburden and conducted seismic tests to determine bedrock elevations. In 1954 the Corps concentrated on updating and expanding the data from the earlier borings, especially at the sites of the proposed Robinson Bay and Grass River locks. The Corps' studies were supplemented by those conducted by New York's Power Authority at the sites of its dikes.[39]

The studies disclosed two minor problems in the composition of the foundation rock. Where Robinson Bay Lock was to be located, the borings indicated a two-foot deep gypsum bed about 50 feet below the top of the rock. At the eastern, downstream end of the lock the gypsum appeared to be dissolved, which made the rock above unsound. This discovery required changes in the original lock design and grouting of the unsound rock. More serious was the discovery of a fault at the site of the Grass River Lock. As a result, planners moved the site of the lock downstream to ensure that the lock walls would be on a sound footing.[40]

Soil investigations also led to changes in the 1942 recommendations. The Buffalo District decided to reexplore areas where deep clay strata had been found in the early 1940s. The new studies focused on particularly soft marine clay near the Robinson Bay Lock and at the lower end of the canal downstream from the Grass River Lock. Laboratory tests of samples obtained from the deep clay strata verified most of the 1942 findings, and located even weaker zones. As a result, contractors would have to be responsible for extensive flattening to compensate for the deep marine clay underneath.

Another line of investigation was the adequacy of concrete aggregates in the area. The 1942 report had made similar studies, but Corps standards for concrete had changed between 1942 and 1954. The new studies were to determine the highest quality of aggregates within an economical distance of hauling. The Power Authority had let a contract to a group of construction companies that was producing aggregates at a nearby quarry. Corps tests showed that quarry to be an excellent source of supply, and the Buffalo District designated it, along with two others, as the three "approved sources" for contractors bidding on the lock projects.[41]

The determination of water-surface levels had the greatest impact on the Corps' design responsibilities on the Long Sault project. Hydraulic design

became a problem because the Corps needed the cooperation of PASNY, the International Joint Commission, and Canadian officials. An agreement on water levels was essential for the final design and specifications of the canal and the locks.

Since so many agencies were involved in the determination of water levels, a final decision would not be reached until after design work was supposed to be completed. The Corps had to devise preliminary projections so that planning could proceed as scheduled. The method of regulation adopted for Lake Ontario would determine water-surface levels above the Robinson Bay Lock. The International Joint Commission, with jurisdiction over boundary water, held responsibility for matters affecting the St. Lawrence and had begun studies on river levels in 1952.

As the St. Lawrence River Joint Board of Control and the International Joint Commission made final studies they came under increasing political pressure. In June and July 1955, congressmen whose constituents might be affected wrote the board about the need to keep in mind the interests of property owners along the shoreline. The board decided to appoint American and Canadian field representatives to gather information about lake stages and outflows before, during, and after construction. These representatives, the board hoped, would allay fears and at least keep fully informed those most likely to be affected adversely.[42]

New York's Power Authority was also vitally interested in the issue. The IJC's Order of Approval for construction of the power works required that PASNY and the Power Commission of Ontario design their excavations and facilities to meet specified velocity and depth criteria. Those standards, which would ease navigation in the river after the power works were in operation, were based on a plan devised by the Canadian Department of Transport, another party to the negotiations on the final method of regulation.[43]

Provincial officials were also involved in those negotiations. Water levels below the Grass River Lock affected Ontario and Quebec. Below Long Sault Canal was a wide reach of the river known as Lake St. Francis. This 30-mile stretch of the river, entirely in Canadian territory, was bounded by Ontario and Quebec.[44]

In the face of so much uncertainty about the final methods of controlling water levels, the Corps estimated the most likely levels ultimately to be adopted by the IJC. However, in November 1955, when the final determinations were issued, they differed from the estimates, and the Corps had to redesign parts of the canal and issue change orders to contractors.[45]

In any event, the first major design consideration was the canal's alignment. The original plans called for several sharp angles in the approach and in the canal itself. Six alternative alignments, along with the one proposed in 1942, were considered in Buffalo District headquarters. Of prime concern were potential hazards to large ships, since the channels were to be comparatively narrow in the canal. Dangerous conditions could result from uncertain currents when combined with night, high winds, fog, and snow. The alignment, therefore, had to provide an upstream entrance to the canal easily accessible in bad weather.[46]

An even more significant departure from the 1942 recommendations was the elimination of a guard gate structure upstream from Robinson Bay Lock. In the 1942 report the gate was to provide protection against damage to or failure of the miter gates at that lock by stopping the flow of water from the pool above the lock. The guard gate was to have two concrete walls, 110 feet apart, with a two-leaf sector-type gate. On both the upstream and downstream approaches to the gate there were to be guide and wing walls similar to those provided at the entrance of the locks. The decision to eliminate the guard gate was taken for many of the same reasons the canal's alignment was changed. District investigations indicated that the guard gate would complicate navigation in and out of the upstream end of Long Sault Canal. Without the gate, vessels could pass through the canal more quickly, speeding up navigation, easing possible congestion, and reducing projected shippers' costs. Moreover, there were other ways to plan for emergencies. Corps designers added vertical lift gates as part of the lock structure to provide for the eventuality of damage to the miter gates.[47]

Elimination of the guard gate led to the abandonment of plans for one of the dikes, a change Corps planners welcomed. The design of the dikes had turned out to be a lengthy process, since the Corps shared design responsibility with PASNY. The Power Authority had responsibility for the majority of the dikes since the power pool flooding covered so many more acres than the canal. But the Corps retained the right to review PASNY's designs, since Buffalo was to take responsibility for contracting for the dikes. After lengthy discussions, PASNY also agreed to "pay for construction of dikes to the extent that dikes would be necessary if only the powerhouse were being constructed."[48]

As with so much else of the planning for Long Sault Canal, Buffalo based its initial design work on the 1942 report. A number of changes in the interim, however, led to relocation and redesign of some of the dikes. Better estimates of the amount of material excavated, for example, allowed the elimination of one dike. Further data about and estimates of wave action also led to changes in the designs and heights of the dikes, especially whether they were to be sloping-faced or vertical-faced structures. Similarly, soil and geological studies indicated that the dikes needed to be moved from where the plans of the early 1940s had placed them. As mentioned before, this was particularly true of the dikes near Grass River Lock which had to be moved because of a fault line. A dike that crossed Robinson Creek was also found to have a foundation of very poor clay. As a result, Buffalo planned for a wide-berm type section to better distribute the dike load. Wide-berm dike sections were also scheduled for placement near Grass River Lock because of the poor clay foundation there.[49]

Of all Buffalo's design responsibilities, however, the design of the locks proved the most complex and demanding. Since 1942, technological improvements had occurred in the machinery and equipment necessary for operating the locks. Other Corps Districts had experience and expertise in these matters, and Buffalo made use of it. Design of the miter gates and their operating machinery, for example, was given to the Nashville District of the

Ohio River Division. Nashville also designed the culvert bulkheads. The marine division in the Philadelphia District helped on the design of the gate lifters for the Seaway locks. The St. Paul District conducted hydraulic model tests to determine the most effective systems for filling and emptying the locks. These tests duplicated the capacities, locations, sizes, and arrangements of required culverts, ports, and diffuser systems. St. Paul also ran tests on the vertical emergency lift gate which was to be installed at the Robinson Bay Lock. These tests determined the forces working on the gate while being lifted, as well as the effect of water running over its top.[50]

The Corps' Buffalo District also made use of the Corps' Waterways Experiment Station (WES) at Vicksburg, Mississippi. There a model of Pollys Gut and the downstream approach to the Grass River Lock was constructed to examine the effect of man-made changes on the south channel of Cornwall Island, a major issue which is discussed in the next chapter, as well as to test the lock's design. The experiment station also provided assistance in determining the effects of the Big Sny channel, at the upstream entrance to Long Sault Canal, on the direction and magnitude of currents in the canal and in studying surges in the intermediate pool between the locks of the canal.[51]

Discussions of lock design began in the summer of 1954, even before the Corps received the assignment as the Corporation's construction agent. By December 1954 basic decisions about design had been reached, and early in 1955 the initial plans moved through the necessary bureaucratic channels for approval.

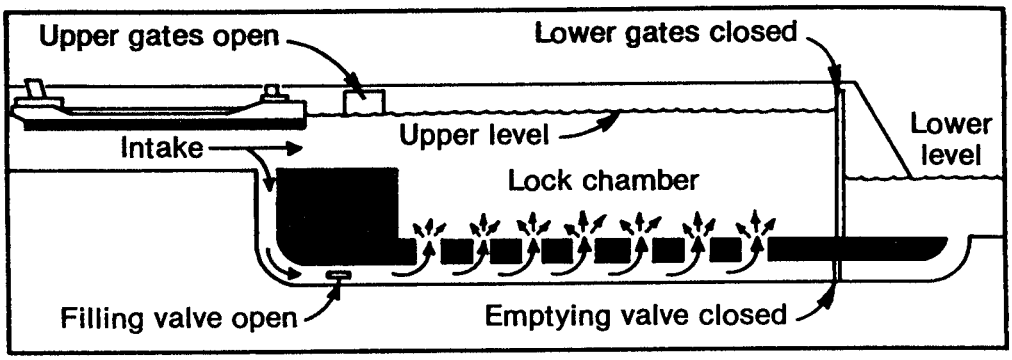
The Robinson Bay Lock, designed by engineers of the Buffalo District and redesignated the Dwight D. Eisenhower Lock in May 1956, was to be located about midway in the length of the Long Sault Canal. The lock was the upstream step of the double-lock system which allowed vessels to bypass the Long Sault Dam. Under normal working conditions, the lock was to provide a lift of about 42 of the 88 feet necessary in the canal. Upstream from the upper miter gate, a vertical lift gate was to prevent a free flow from the upper pool of the canal. A highway tunnel through the upper sill of the lock was to carry traffic to and from Barnhart Island and mainland Canada. This tunnel replaced the 1942 report's recommendation of a highway bridge across the lock.[52]

In working up the initial designs the Buffalo District followed standard Corps' engineering procedures. Lock walls and sills were analyzed for strength and durability under a series of varying conditions of operation: the hydraulic forces resulting from high and low water levels, earthquakes, and hawser pull. Final determination of the effects of these forces were in some instances a matter of continuing discussion, even after the initial design had received approval. Many of these design issues were settled after model tests at the St. Anthony's Falls Hydraulic Laboratory of the University of Minnesota. The Corps helped fund the construction there of a model of the Robinson Bay Lock, which was later modified to represent the lock at Grass River.[53]

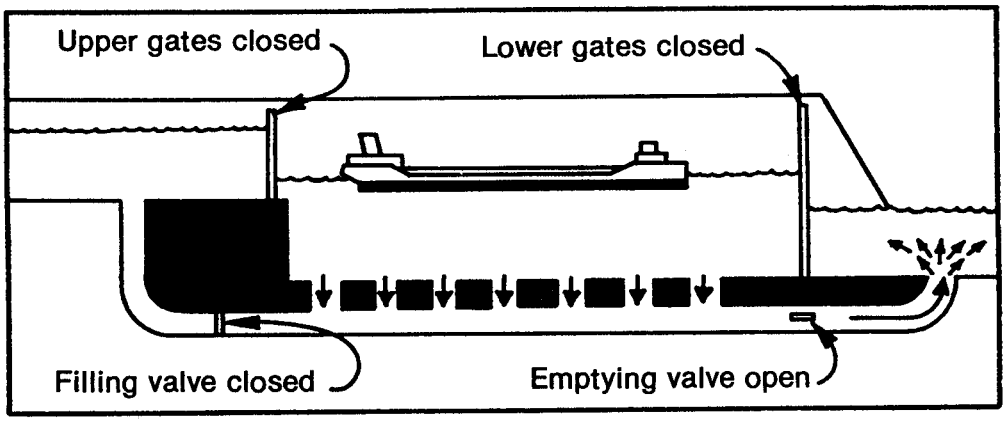
Buffalo began design work on the Grass River Lock, which was to provide a lift of approximately 46 feet, after its planning staff got to work on the upstream Robinson Bay Lock. The design of the downstream lock, redesignated the Bertrand H. Snell Lock in 1958, differed from that at Robinson

How Navigation Locks Operate

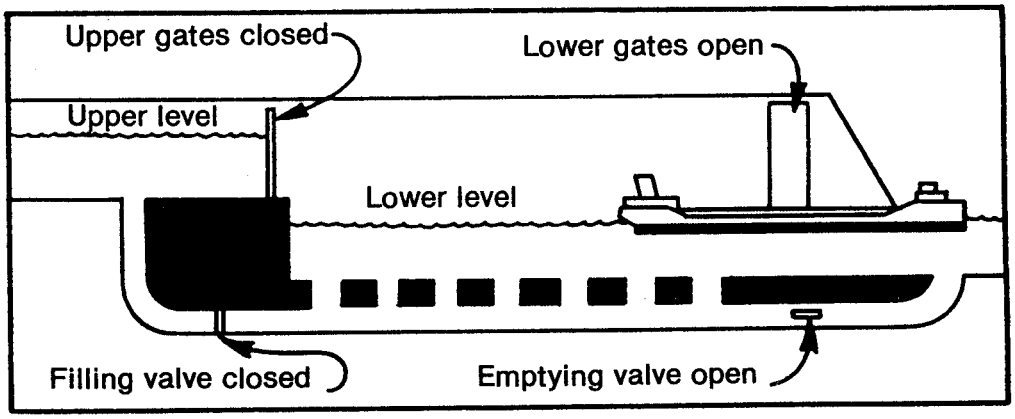
These diagrams show how a ship is lowered in a lock. A ship is raised by reversing the operation. No pumps are required, the water is merely allowed to seek its own level.



With both upper gates and lower gates closed, and with the emptying valve closed and the filling valve open, the lock chamber has been filled to the upper level. The upper gates are then opened allowing the ship to enter the lock chamber.



Now the ship is in the lock chamber. The upper and lower gates and the filling valve are closed. The emptying valve has been opened to allow water to flow from the lock chamber to the lower level.



With the water level in the lock chamber down to the lower level, the lower gates have been opened, and the ship is leaving the lock chamber. After this, the lock is ready for an upbound ship to come in and be lifted, or may be filled to lower another down-bound ship.

Bay primarily because of its location in the vicinity of soft marine clays. In addition to a change in the design of the lock chamber floor, model tests had shown that the lock needed a different emptying and filling system because of excessive turbulence. Many of the features adopted at Robinson Bay, however, applied downstream too. Such standard design made mooring bits, rope fenders, and stop log derricks almost interchangeable between the two locks. Much the same could be said for the electrical system, as well as the miter gates and lock machinery.[54]

By the end of 1955 the design of the canal and locks had received the approval of the Corps and the Seaway Development Corporation. Other factors, however, also influenced project designing. In response to requests from the Buffalo District, potential users of the Seaway commented on several features of the project. Their recommendations were perhaps most significant in the layout of guide and approach walls which in the end generally "reflect[ed] the desires of the Lake Carriers' Association." The Seaway Authority forwarded recommendations from the Dominion Marine Association and the Shipping Federation of Canada which buttressed the views of their American counterparts.[55] The potential users and the Corps kept up a dialogue as lock and canal features continued to be revised. While the Engineers accepted many of their suggestions, others were rejected.

Among those rejected was maximum vessel size using the canal and locks. Both the Corporation and the Seaway Authority knew this to be a "sensitive" issue to shippers; it had come up in regard to dimensions for the St. Marys Falls canal and locks and the Welland Canal. The Corporation had determined that the locks should accommodate 715-foot ships. Slightly longer (730 feet) and wider (75-foot beam) ships could use the locks, but they would have to receive special scheduling and handling. As anticipated, shipowners with larger ships objected. The Engineers supported the Corporation; a longer lock was not justified in view of the relatively small number of longer ships likely to use the Seaway.[56]

In any event, a dialogue with potential users of civil works projects was not unusual. Essentially, the Corps' internal design process continued routinely. By the end of 1956 about 90 percent of the design work was completed.[57] Where the Corps faced most of its problems was in its need to deal with other agencies such as the Power Authority of the State of New York, the Seaway Development Corporation, and the St. Lawrence River Joint Board of Engineers. The Corps' design process was a matter of constant elaboration on plans that moved through the Corps' command structure. To the Engineers this was a routine procedure, familiar to staff at all levels. But the Power Authority and the Corporation were not so accustomed to the Corps' procedures; neither had a staff large enough to handle expeditiously the heavy volume of paperwork generated by the Corps' planners. Inevitably delays in their handling of plans review created discontent in the Corps.

The key to understanding the Corps' attitudes toward delays in design was the change in the date of raising the power pool. That change of date, insisted upon by PASNY, had reduced significantly the amount of time that the Corps would have to cope with unforeseen events. Thus delays in the planning

process troubled Corps officials. These delays increased the pressure on other aspects of the project and had the potential of preventing the Engineers from completing the navigation improvements before the Power Authority flooded the power pool in July 1958.

Difficulties with the New York Power Authority began early. At the first meetings over dike design in September 1954, Corps representatives realized that PASNY's design engineers (Uhl, Hall and Rich) would not be able to meet the Corps' schedule for all of the dikes to be built above Robinson Bay Lock. As a result, the Engineers added two dike designs to their planning work for the lock. Scheduling was critical because the Corps was to construct all of the dikes for the project, even those designed by PASNY. Buffalo went ahead and designed the two dikes, which were modified somewhat by the Chief's office late in December 1954. In the meantime, PASNY's private engineering firm continued its design work and in mid-January 1955 delivered designs for the two dikes to the Corps. While acceptable from an engineering point of view, they differed from those prepared by the Corps. Buffalo was reluctant to make the changes that PASNY insisted upon. To do so required modifications by addenda to contracts that were already out to bid.[58]

The Power Authority nevertheless insisted on the modifications. Ultimately, Buffalo gave in to PASNY's demands. Colonel Olmstead feared that pressing the point so early in the relationship might sour future relations. His willingness to concede the point might also have had something to do with the higher level negotiations then taking place with PASNY over the date to raise the power pool. There seemed no reason to alienate the Power Authority over the small issue of dike design while the major question of when to elevate the power pool was still being discussed.[59]

Relations between the Corps and the Power Authority were eased when Uhl, Hall and Rich established an office in Massena. PASNY, however, became even more cooperative when it began to face serious difficulties that might have delayed its own timetable for flooding the power pool. In November 1955 the St. Lawrence River Joint Board of Engineers formally discussed the Power Authority's "non-compliance" with the International Joint Commission Order of Approval granting the authority to construct the power works. The order had specifically required that PASNY and the Hydro-Electric Power Commission of Ontario "submit plans and specifications in time for Board approval prior to construction." PASNY had failed to obtain board approval before beginning work. To be sure, some of the work in question involved preliminary preparation of worksites. But other work involved major features of the power project. Most troubling to the board were doubts about the adequacy of the foundation for Long Sault Dam, the key to the generation of power. Although ultimately resolved to everyone's satisfaction, the board threatened to issue an order for a stop in construction. Such a turn of events could have significantly delayed the power works.[60]

Officials at PASNY turned their attention to the Joint Board of Engineers, and the Corps found the Power Authority easier to work with on the design and construction of the dikes. In any event, dike design was one of the earliest of the planning projects to be completed, and, on that project, the Corps and PASNY had not had to work closely with each other for a long

period of time. This was not the case with the Corporation, which had full responsibility for all aspects of the navigation works. Eventually, the Corps and the Corporation settled on a workable routine for designing the Seaway. But there were problems, aside from what the Corps saw as the Corporation's overly slow process of design review.

A serious design dispute arose between the Corps and the Corporation over the layout of the locks in the Long Sault Canal. Deputy Administrator Oettershagen objected to Corps plans for guide wall locations as being dangerous to shipping. To no avail, Corps officials pointed out that their design had been discussed with and approved by the Lake Carriers' Association. There is no doubt that Oettershagen felt strongly about issues of safety. But his adamancy also might very well have been an attempt on his part to assert the Corporation's authority early in the relationship. In any event, substantial changes were necessary. While these alterations were not the only cause, the Corps eventually had to extend by 60 days the submission of its design memoranda on the two locks.[61]

The Engineers were most exasperated with the Corporation over determining the final water levels upstream and downstream from the Long Sault Canal. Corps officials pressed the Corporation to use its influence to hurry along the decision on water levels. Toward the end of the process, which involved both national governments, private interests, and international agencies, the Corps saw the Corporation as delaying a final resolution of the issue. In fact, by the fall of 1955, the International Joint Commission had submitted to each government a plan for regulating water levels. In the meantime, the St. Lawrence River Joint Board of Engineers proposed extra depth allowances in the navigation channels to allow for rock bottoms and surges. The Canadian Seaway Authority had promptly submitted its recommendations, but the Seaway Development Corporation had not been heard from.

By November 1955 both the St. Lawrence River Joint Board of Engineers and Corps officials believed that the Corporation had to address itself to "this pressing problem." They turned to Holle who at that time was both a member of the Joint Board of Engineers and Deputy Chief of Engineers for Construction. He was to take up the issue personally with Corporation Administrator Castle. A timely decision was necessary, and the Corps was exasperated by going through the "clogged channels" of the Corporation.[62]

Delays nevertheless were not always the fault of one of the agencies that the Corps had to deal with. The Engineers themselves were at fault at times. The most glaring example was an oversight in design of the lock gates. The upper gates could be damaged by ships with sharply raked bows, but the Corps had taken into account only vessels with vertical bows, used for the most part in Lakes shipping. This oversight is remarkable in that so much of the argument in favor of the Seaway was based on its opening the interior lake ports to ocean-going vessels, which were more likely to have raked bows. In any event, the Canadians brought the problem to the Corps' attention and the upper gates were redesigned to minimize the possibility of damage from ocean-going shipping.[63]

The design process continued apace through 1955 and 1956. As planning for the major features slacked off, engineers in the Buffalo office turned

CONSTRUCTION CONTRACTS

Thousand Islands Work Site

-Dredging in St. Lawrence River, between Clayton and Alexandria Bay, N.Y. and between Alexandria Bay and Morristown, N.Y.:
Tecon Corporation
-Construction of navigation aids:
Arnold M. Diamond, Inc.

Long Sault Work Site

-Excavation for Dwight D. Eisenhower Lock and Dikes:
Jack and Jim Maser, Inc. (Tecon Corporation)
-Excavation for Bertrand H. Snell Lock and Dikes:
Dutcher Construction Corp.
-Construction of Dwight D. Eisenhower Lock:
Joint venture of Morrison-Knudsen Co. Inc.; Perini Quebec, Inc.; and Walsh Construction Co.
-Construction of Bertrand H. Snell Lock:
Joint venture of B. Perini & Sons, Inc.; Walsh Construction Co.; Morrison-Knudsen, Inc.; Peter Kiewit Sons' Co.; and the Utah Construction Co.
-Dredging Downstream Approach to Snell Lock:
Great Lakes Dredge and Dock Co.
-Excavation of Upstream Portion of Long Sault Canal:
Badgett Mine Stripping Corp.
-Excavation of Mainland Portion of Long Sault Canal:
Peter Kiewit Sons' Co. and Morrison-Knudsen Co., Inc.
-Construction of Navigation Aids, Long Sault Canal:
Arnold M. Diamond, Inc.

Cornwall Island Work Site

-Construction of Superstructure for High-Level Bridge:
United States Steel Corp.
-Dredging, South Channel:
Merritt-Chapman & Scott Corp. and S. J. Groves and Sons Co.
-Construction of Navigation Aids:
Arnold M. Diamond, Inc.

Source: U.S., Congress, House of Representatives, Committee on Public Works, *Annual Report of the Saint Lawrence Seaway Development Corporation for 1957*, H. Doc. 326, 85th Cong., 2 sess., 1958, pp. 18-23, 38-39.

their attention to less critical parts of the project. They were involved in the design of an administration building for the Corporation, the control houses near the locks, and repair shops and yards. At times, too, they took part in discussions of landscaping near the locks and overlooks for sightseers. Once designs and specifications were approved, the Corps advertised for bids on contracts.[64]

Contracts and Contractors

The Engineers' extensive experience in dealing with contractors proved a critical element in constructing the Seaway. As part of standard practice the Corps had its field staff compile data for weekly progress reports. But the Corps' increasing sense of pressure to meet deadlines increased the need for vigilance. Corps officials closely monitored contractors who fell behind, while helping others who had difficulties, such as in obtaining materials. Because effective relations with contractors were essential to meeting deadlines, the Corps vigorously resisted attempts by the Corporation to change standard contracting procedures.

By early 1955 the Engineers had let four major excavation contracts. These were for the main portion of the Long Sault Canal, its westerly end, and the two lock sites. The Corps followed established practices, using standard forms for invitations to bid and for contracts.[65]

Corps contract procedures at times, however, became a source of sharp conflict with the Corporation. At first the Corporation deferred to the Corps on contracting matters, but as Seaway officials became more confident they approached the Corps with suggestions, questions, and finally criticisms. In reviewing plans and cost estimates late in 1955, for example, the Corporation thought that federal freight taxes possibly might be saved "by inserting a provision in the specifications permitting the Contracting Officer to require the contractor to ship certain construction materials on Government Bills of Lading." Deputy Administrator Oettershagen believed that real savings could be realized "if the procedure was administered efficiently" and applied to such bulk supplies as aggregates and cement.[66]

The Corps opposed using government bills of lading. In the first place, such a procedure would be difficult to administer. Second, and of greater importance to the Engineers, "the contracting officer would then be assuming a responsibility with regard to shipment of material which could react greatly to the Government's disadvantage." The Corps argued that the bills of lading would represent a commitment to take responsibility for shipping, in many instances the most demanding managerial task for contractors. The Engineers remained firm on this issue. To have accepted the Corporation's suggestion would have further complicated an already complex process of design, bidding, and contracting.[67]

The Engineers were uncompromising toward other Corporation suggestions to change standard contracting procedures. The Corporation, and personnel in the Buffalo District, anticipated that major lawsuits would be filed

over disputes with one or two of the Seaway contractors. The Corporation believed that its legal counsel and perhaps representatives of the Department of Justice should start preparing to defend the government's interests. The Corps, however, was adamantly opposed. General Holle, Special Assistant to the Chief of Engineers at the time, wrote rather bluntly that it was not "necessary, desirable, or appropriate to involve either the Corporation or the Department of Justice" in precautionary preparations for lawsuits. If litigation became necessary, Holle noted, the Corps had experience in such matters and a well-trained legal staff.[68]

One of the sharpest exchanges about contracts took place in 1956 over the proper kinds of supply and construction contracts the Corps should issue as the agent of the Corporation. The Corps routinely issued contracts in its own name. The Corporation, however, had inquired into the practices of other government corporations and found that they executed and carried out contracts in their own names. "Since the accountability and responsibility for the Corporation's funds," Lewis Castle maintained, "are not transferred to the Corps of Engineers in the same manner as appropriated funds are transferred, the best practice is to have all contracts issued by the Corps of Engineers in the name of the Saint Lawrence Seaway Corporation."[69]

The Chief's office vigorously rejected any notion of changing the contracting procedure used by the Buffalo District. Such a change "would create a situation and relationship radically different from the standard, accepted, and time-proven arrangement whereby one Government agency accomplishes a service for another." As arranged in the initial understandings between the two entities, the Corporation as the "served" agency ultimately would become the "owner" of the works completed by the Corps. But "the one agency does not perform and act as the 'agent' for the other," Holle wrote. To undermine the notion that the Corps was performing a service would only confuse contractors who would not know which agency's operating policies and procedures applied to their contracts. The result would be uncertainty about the contracting officer's authority and the chain of command to be used in appeals of contested decisions of the contracting officer. The Office of the Chief of Engineers would go no further on this essential issue than to promise to make clearer that works were being constructed by the Corps for the Corporation. The Chief instructed his subordinates in the North Central Division and in the Buffalo District that "all reasonable and proper wording" be adopted in bid advertisements and contracts to ensure that contractors understood that the works would become the property of the Seaway Corporation.[70]

In short, at the end of December 1956, two years into the project, the Corps was not about to change contracting procedures. The Chief was not prepared to give ground on a fundamental relationship that the Engineers thought had been settled in September 1954. Ultimately, Holle unequivocally rejected Castle's ideas: "I believe that it would be impracticable, unwarranted, unnecessary and undesirable for the Corps of Engineers' agencies or officials to act as 'agents' in the legal sense, for the Corporation, as you propose."[71]

The Corporation's questioning of the Corps' contracting procedures was part of a dispute over larger issues. The Corporation was concerned about

its future status once the Seaway was completed. Questions, therefore, over the proper relationship between government corporations and other agencies were an attempt by Castle to assert the independence of the Corporation. Questioning legal definitions of "agency" and Corps contract procedures helped affirm the Corporation's position that it was a public entity empowered not only to build the Seaway, but also to maintain and operate it once completed. Corps adamancy was part of its attempt to gain responsibility for operations and maintenance once the Seaway opened, a subject covered in the next chapter.

Whatever the political and bureaucratic reasons for the dispute, the Corps also had practical reasons for opposing diminishing its role in dealing with contractors. Traditional practices were necessary because under an increasingly tight schedule new procedures would have further delayed the project. Familiar procedures allowed the Corps the time to work outside of channels when necessary to help contractors fulfill their contracts. The Corps' long-established contract relationships allowed careful supervision of contractors' work. A change in the Engineers' contracting authority would have deflected attention from both helping and cajoling contractors when required.

Construction of such a multifaceted project involved the Engineers in a variety of construction questions, from the contractors' choice of earthen as opposed to metal cofferdams to the best way to install electrical lock equipment. In the face of difficulties, contacts between the Corps and the contractors increased.

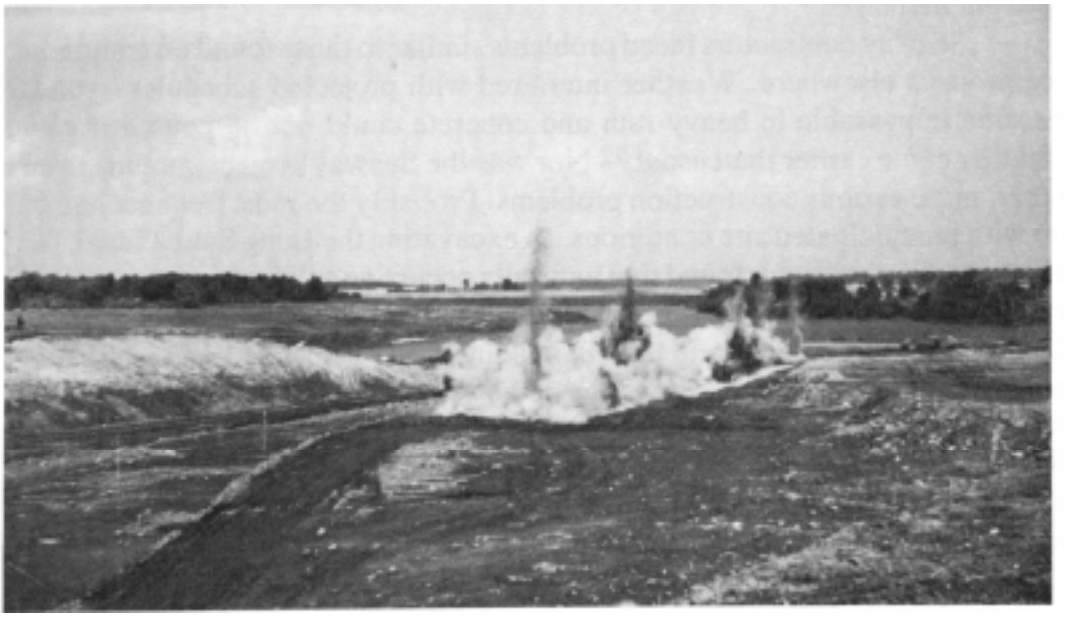
Seaway contractors faced problems similar to those found on comparable projects elsewhere. Weather interfered with projected schedules—roads became impassable in heavy rain and concrete could not be poured if cold weather came earlier than usual.[72] Nor was the Seaway project immune from other, more serious construction problems. Probably the most frequent had to do with unanticipated site conditions. In excavating the Long Sault Canal, for example, the contractor found that naturally occurring calcium carbonates had cemented the glacial till. In other sections of the area, the same contractor found that there were fines in the till, making it very sensitive to moisture and equally as difficult to work in as the cemented till as it created material difficult to manipulate once it was broken for excavation. Contractors in the Robinson Bay Lock excavation were also slowed by the make-up of the till, and they were frustrated by the discovery of groundwater at an elevation higher than that indicated on the contract drawings.[73]

Not all construction problems were the result of nature. There were man-made reasons for construction not going the way the Corps and the contractors had originally planned. Some were relatively minor. As part of the Robinson Bay Lock excavation, for example, the contractor had to repair a public road outside the contract area. Not to do so would have slowed his work. On this project the same contractor also had to move utility lines in order to proceed with his schedule.[74]

Other man-made problems assumed major proportions. Nationwide strikes in the steel industry in 1956 and among concrete producers in 1957 dis-

Excavating Long Sault Canal

Excavation, September 1955.



Blasting, August 1956.

Excavation, September 1956.

The project, July 1957.

rupted work. The Corps routinely assisted contractors facing severe difficulties in obtaining equipment or supplies. During the steel strike, however, the Engineers went to extra efforts to minimize the dispute's negative impact on the Seaway. With equipment suppliers affected, the Corporation and the Corps approached the Office of Defense Mobilization to obtain a priority rating for the Seaway. Despite several lengthy conferences on the subject, that office rejected the request. Both the Engineers and the Corporation decided not to appeal the decision immediately, relying instead on the ability of the Corps to assist manufacturers in rescheduling their production or in seeking out and obtaining steel supplies. The Chief's office, however, planned to appeal the decision if it proved necessary to keep the Seaway on schedule.[75]

The contractor most seriously hurt by the steel strike, the Willamette Iron and Steel Company of Portland, Oregon, produced the operating machinery for the vertical lift gates at Eisenhower Lock (formerly the Robinson Bay Lock) and the wire rope fenders for both locks. These features were to provide a back-up to the miter gates should they fail, and the locks could not be operated until the back-up features were in place. The contractor specialized in hydroelectric and irrigation dams and was highly-regarded as a manufacturer of custom machine plating and steel fabrication products. The firm had fulfilled Corps contracts before and was well-known to the Portland District Engineer. Nevertheless, by February 1957, the contractor had only been able to complete 54 percent of a contract that was scheduled for 82 percent completion by that date.[76]

Willamette Iron and Steel Company's request for a seven-month contract extension was a serious blow to Corps hopes to finish on schedule. The company was also committed to several large contracts for the Corps' San Francisco District and the Atomic Energy Commission at the time that the steel strike began. Neither was willing to defer its schedules to accommodate the Buffalo District. Their contracts required extensive time, as did the Seaway contract, on the company's large machine tools. Even if these problems of production scheduling had been easily resolvable, there remained the fact that the firm was having difficulty obtaining critical items such as 4"-square steel bars.[77]

Unable to get the Office of Defense Mobilization to issue priority status to the Seaway, Buffalo joined Portland District officials in negotiating a mutually agreeable plan with the company to reschedule the plant's work. The result of this close collaboration was a reduction in the anticipated delay from seven to four months. While a four-month extension gave the Corps little extra time should there be difficulties installing the equipment, it held out the prospect of completing the project on time. Installations of both the rope fenders and the machinery for the vertical lift gates were not in themselves difficult tasks. That gamble seemed better than relying on an appeal of the decision refusing the Seaway priority status.[78]

The cement strike in June 1957 jeopardized concrete work at both lock sites. Supplies of cement were available in Canada, but the contractors working under Corps contracts were required by law to buy their supplies in the

United States. The law had originally been passed in 1933 to stimulate depressed American industry.[79]

Buffalo acted swiftly to help the contractors in need of cement. Similar problems had occurred before, and the Corps had a standard procedure to gain exemptions from the "Buy American Act." Within ten days of strikers closing down the plants supplying the Seaway contractors, Buffalo obtained the exemption that would allow them to buy concrete in Canada.[80]

The District office was not always able to act so swiftly, but it continued to keep close working relationships with its contractors. When, for example, Grass River Lock contractors were unable to obtain gantry cranes from private sources, they turned to the Buffalo District office for assistance. District officials arranged for the contractors to rent the cranes from the Navy.[81]

A close working relationship with companies performing construction projects was standard practice in the Corps. What was fairly routine became absolutely essential to the Seaway, however, when, in February 1956, bidding on the Grass River Lock turned up only one bid. The bid came from B. Perini & Sons, Inc., Walsh Construction Co., Morrison-Knudsen, Inc., Peter Kiewit Sons' Co., and the Utah Construction Co. proposing a joint venture. Their price was 23 percent above Corps projections. The Chief's office required that bids 15 percent over Engineer estimates be justified before acceptance. The Buffalo District investigated and urged that the bid be accepted rather than readvertised. District personnel knew that the contractors engaged on the Eisenhower Lock were not interested in the Grass River Lock. Construction conditions at the upstream lock had played a part in the contractors' decision not to bid on the one downstream. Not only had there been a large number of changes once work had begun, but there had also been a shortage of suitable workers. Moreover, in the opinion of experienced contractors, labor production was low, in part because of poor living conditions and in part because of increasingly tight schedules. Worker dissatisfaction at times led to disputes and work stoppages. These problems invariably increased labor costs. Construction conditions, however, were not the only reasons for lack of interest in bidding on the Grass River Lock. There were other large projects about to be advertised on the West Coast, and several of the contractors involved in the Seaway were preparing bids on those contracts.[82]

Thus the circumstances inclined Buffalo toward supporting the one bid from a consortium of contractors, as did a closer examination of the reasons the contractors had arrived at their price. The most costly item in the bid was for concrete. Corps estimates contemplated placing the concrete as late as December, making some allowances for extra costs for heating and drying. But the contractors contemplated having to place the concrete during the rest of the winter season and they convinced Buffalo that this winter concreting was "not an unreasonable expectation."[83]

The contractors also convinced District officials of the reasonableness of their bid on other aspects of the contract. Of the five involved in the joint venture, four had done work on either the Seaway or the power project. They all agreed that original cost estimates for excavation in the Long Sault Canal and at the Eisenhower Lock had not been realistic. Moreover, Buffalo's origi-

nally projected costs for the Grass River Lock did not reflect changed circumstances since the advertisement to bid had first been prepared. Government estimates for steel sheet and bearing piles, for example, assumed that the material would be delivered during November and December 1956, allowing the driving of the piling while the ground was frozen. In fact, the expected delivery date was most likely early spring 1957. A portion of the driving, therefore, would have to be done after the frost left the ground, making it likely that operations would be extremely difficult.[84]

Buffalo, thus, saw no advantage in readvertising the bid. If anything, a further delay would probably increase the costs even more, since there would be increased pressure on the contractors to complete a complex project in a yet even shorter period of time. The North Central Division Engineer, Colonel Berrigan, accepted Buffalo's argument, especially in view of the fact that the contractors at the Eisenhower Lock were losing money. "In the case of the Robinson Bay Lock," Berrigan observed, "the government accepts an indicated advantage or loss to the contractor. In the case of the Grass River Lock the advantage rests with the contractor. Such are the results of the bidding system." In his review of the situation, therefore, he endorsed Buffalo's position and recommended against substituting a negotiated lump sum or a negotiated cost-plus-fixed-fee contract for the bid contract.[85]

The Office of the Chief of Engineers went along with Buffalo's and the Division Engineer's recommendations. As it turned out, the problems over this bid led to later recriminations between the Corps and the Corporation. Under the press of congressional questioning Corporation officials complained about the Corps' inability to attract suitable bids. Corps officials thought this unfair, given the circumstances. In any event, getting a contractor did not solve all the problems involved in constructing the Grass River Lock.[86]

Even after March 1956, when the Corps accepted the one bid proffered for the Grass River Lock, Buffalo still faced construction problems at the lock site. Excavation work scheduled for completion by the time the lock contract was awarded remained incomplete. Indeed, the excavation contractors on that site worried both the Corps and the Corporation. Originally awarded the contract in April 1955, the firm had planned to complete excavation by February 1956. By the summer of 1955, the company had fallen behind and was operating at a loss. By late March 1956, the spring thaw had set in, making haul roads impassable and bringing excavation work to a halt. Work would apparently not begin again until May. And the remaining excavation was in hard till and a small area of clay, which was very difficult to approach with equipment.

These circumstances were troubling enough in themselves, but they kept the Grass River Lock construction contractors from beginning their work. The Buffalo District knew that the schedule for the lock was "very tight" and that "the time allowed under the contract is the absolute minimum required for completion on the scheduled date."[87] Early in April, the Buffalo office brought together representatives of both contractors. The upshot of these meetings was the transfer of the excavation contract to the lock contractors. The latter were then to arrange for the scheduling of the excavation, working it into their overall plans for building the lock. This was an excellent solution

from the Corps' point of view. It not only increased the likelihood that the lock would be built on schedule, but also removed the possibility of claims against the government by the lock contractors. If the excavation contractor had in fact defaulted, delaying substantially the beginning of work on the lock, the lock contractors could have brought claims for any losses due to the delay. Once the joint contracting venture got under way at Grass River, the Corps began to see improvements. Indeed, by February 1957, the Engineers were able to report that work at the Grass River Lock was up to schedule.[88]

The on-schedule completion of the Seaway in 1958, therefore, owed much to the careful coordination of scheduling, designing, and construction. As we have seen, this was not a process without problems. But the Corps' procedures refined over the years had the effect of minimizing problems or at least providing a mechanism for solving them. These same procedures were followed in the projects designed for improving navigation in the south channel of Cornwall Island and the Thousand Islands. There, as at Long Sault, the Engineers maintained a policy of accommodating the interests of the other agencies engaged in the Seaway project, while adhering as strictly as possible to standard operating practices.

Constructing Eisenhower Lock (Robinson Bay)

Model B. Scrapers doing early excavation, September 1955.

Shovels excavating, January 1956.

The drainage problem during construction, February 1956.

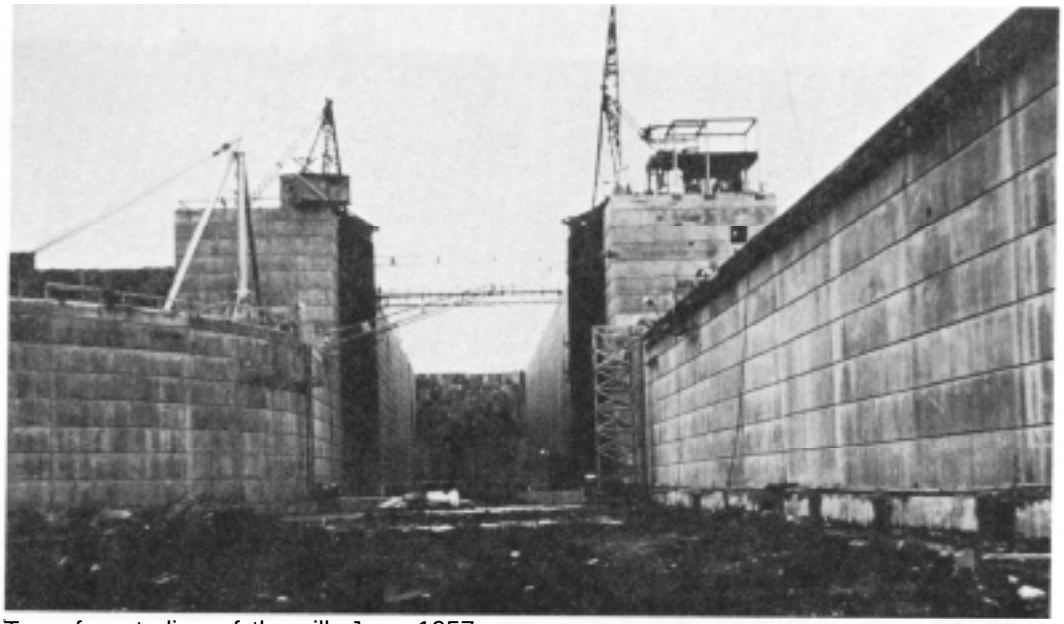
St. Lawrence Sea way Development Corporation

Construction traffic during the excavation, February 1956.

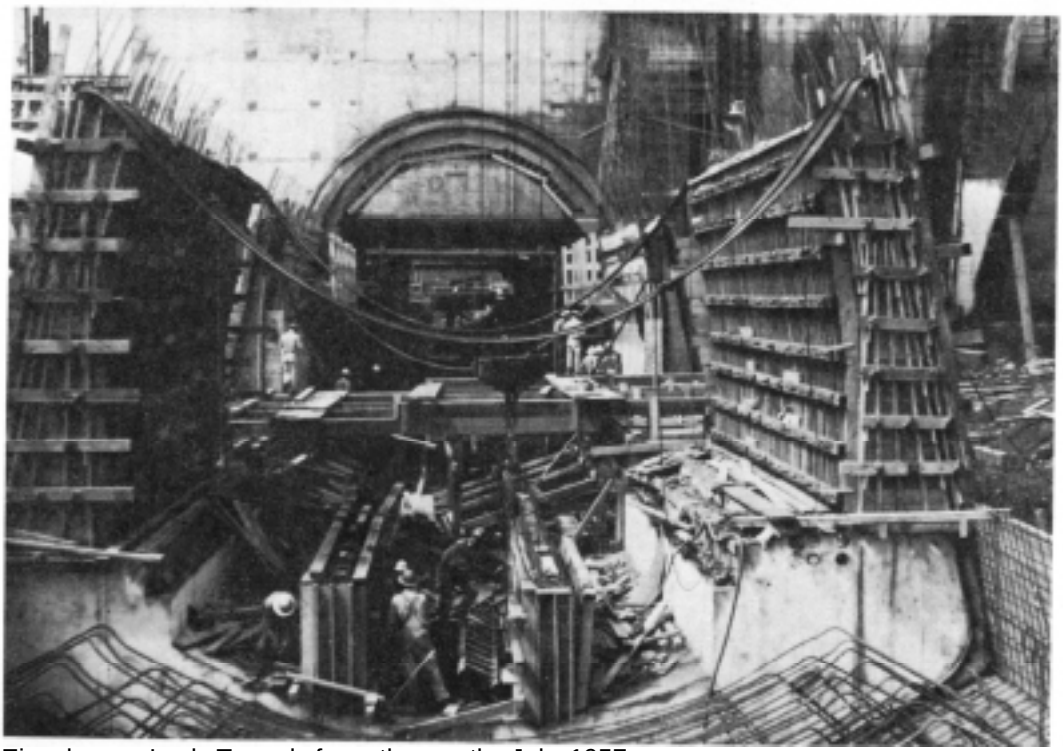
St. Lawrence Sea way Development Corporation

Construction, looking eastward, August 1956.

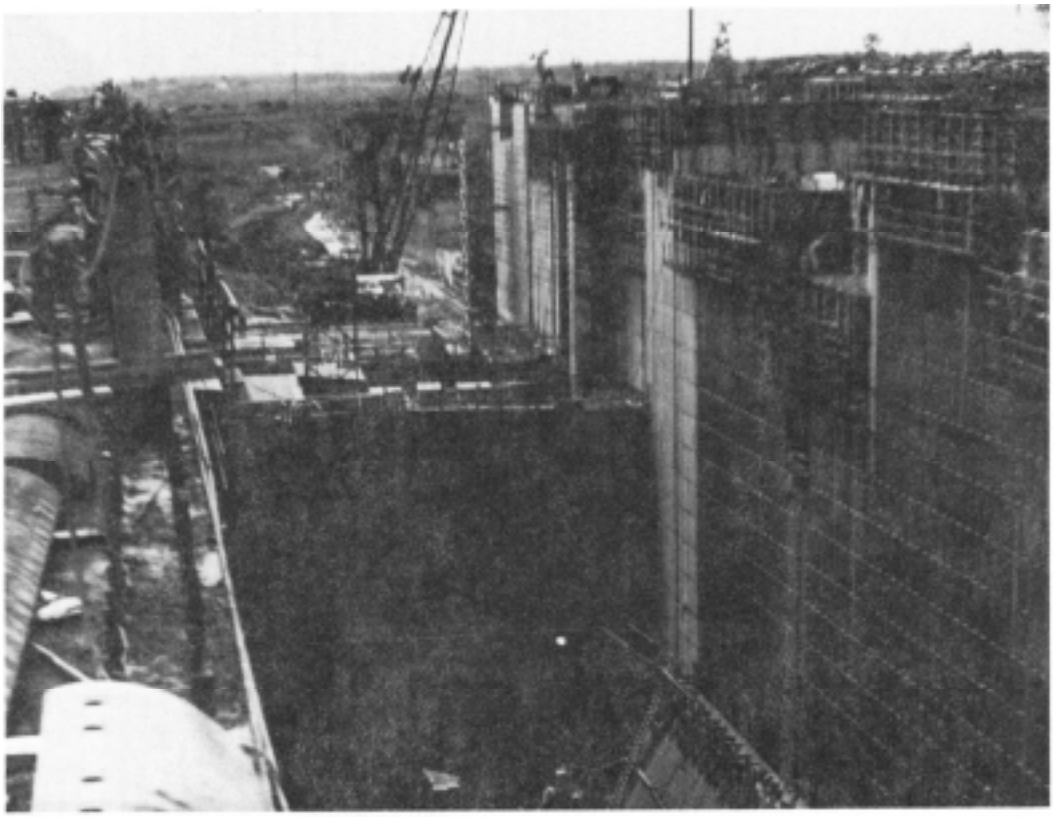
Lock and related construction activity, September 1956.



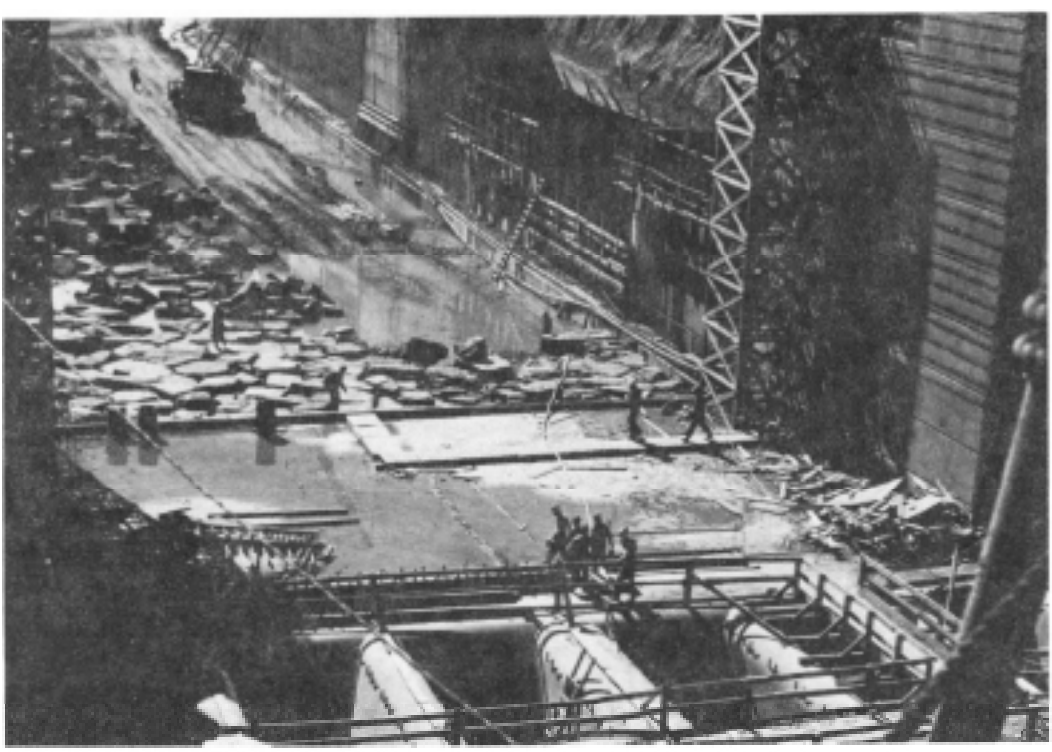
Top of centerline of the sill, June 1957.



Eisenhower Lock Tunnel, from the south, July 1957.



Upper sill, looking west, July 1957.



Placing derrick stone in upstream approach, August 1957.

Looking downstream from centerline; note fenders along walls, November 1957.

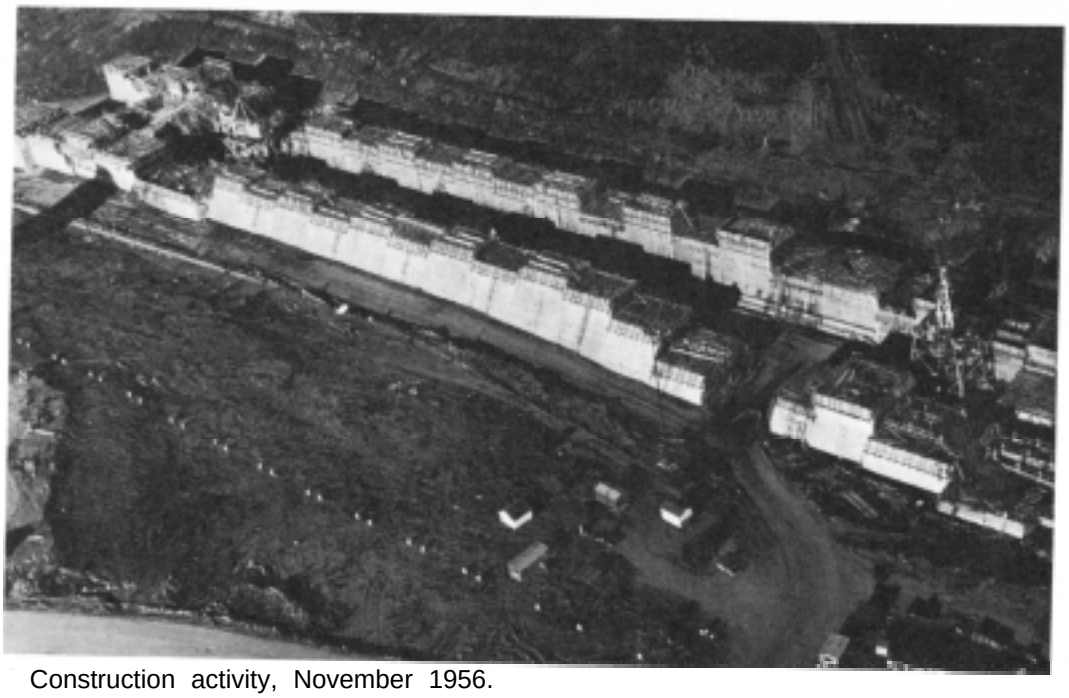
Eisenhower Lock from the north upstream bank, May 1958. Note the upstream miter gate in operable condition and the vertical lift gate in raised position.

Constructing Snell Lock (Grass River)

Excavation, from the west end, February 1956. A bottom-dump Euclid in the foreground.

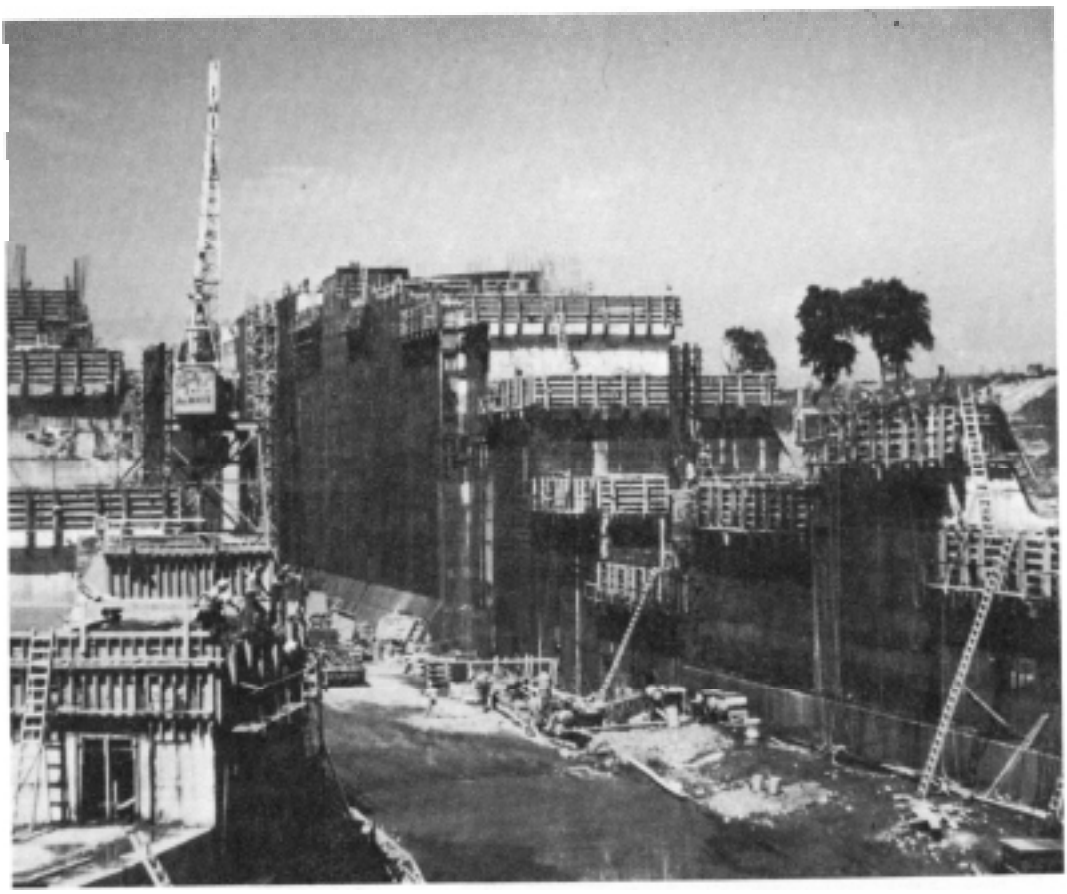
Excavation, February 1956. Glacial till in foreground, marine clay in background.

Early concrete construction, September 1956.

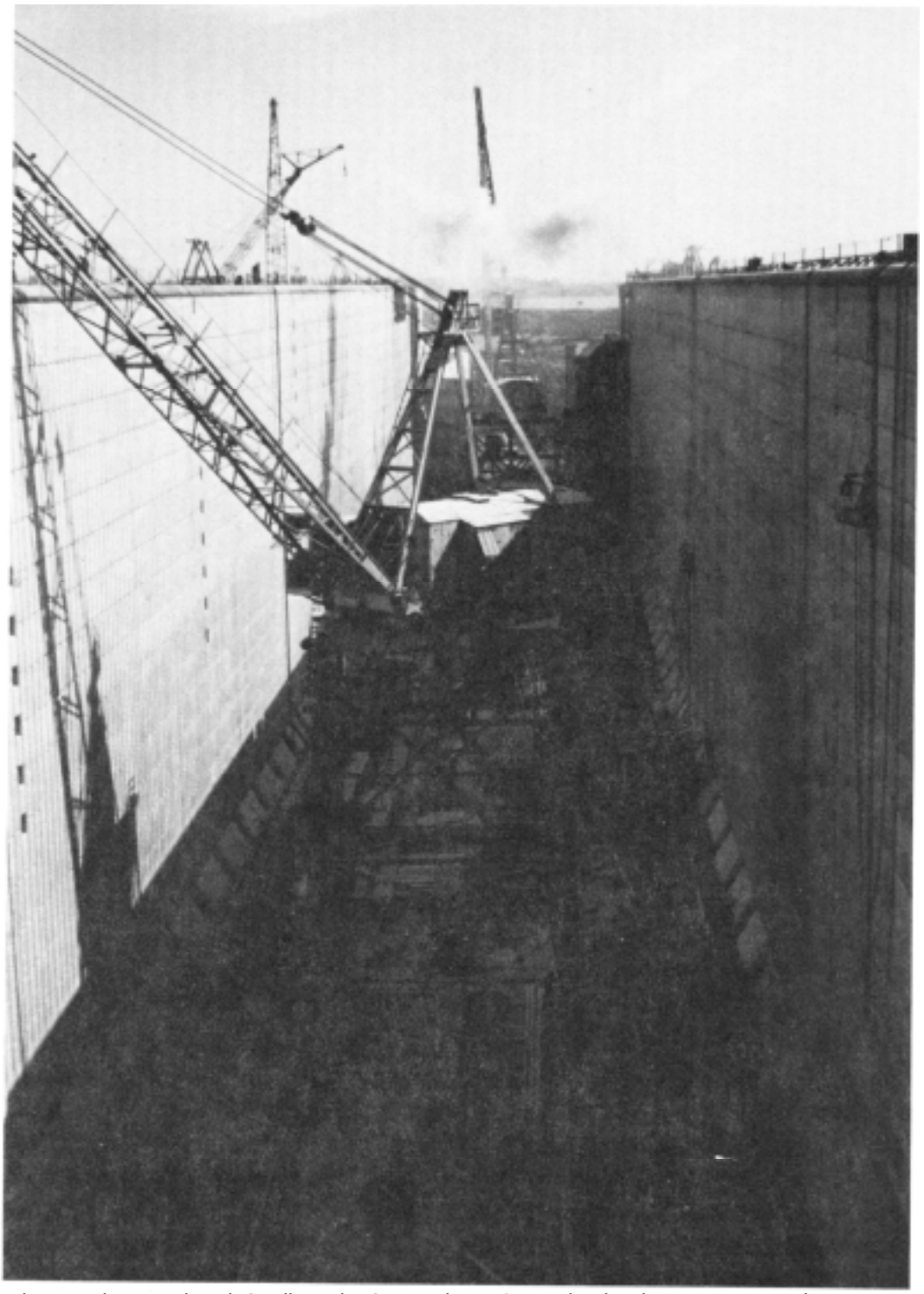


Construction activity, November 1956.

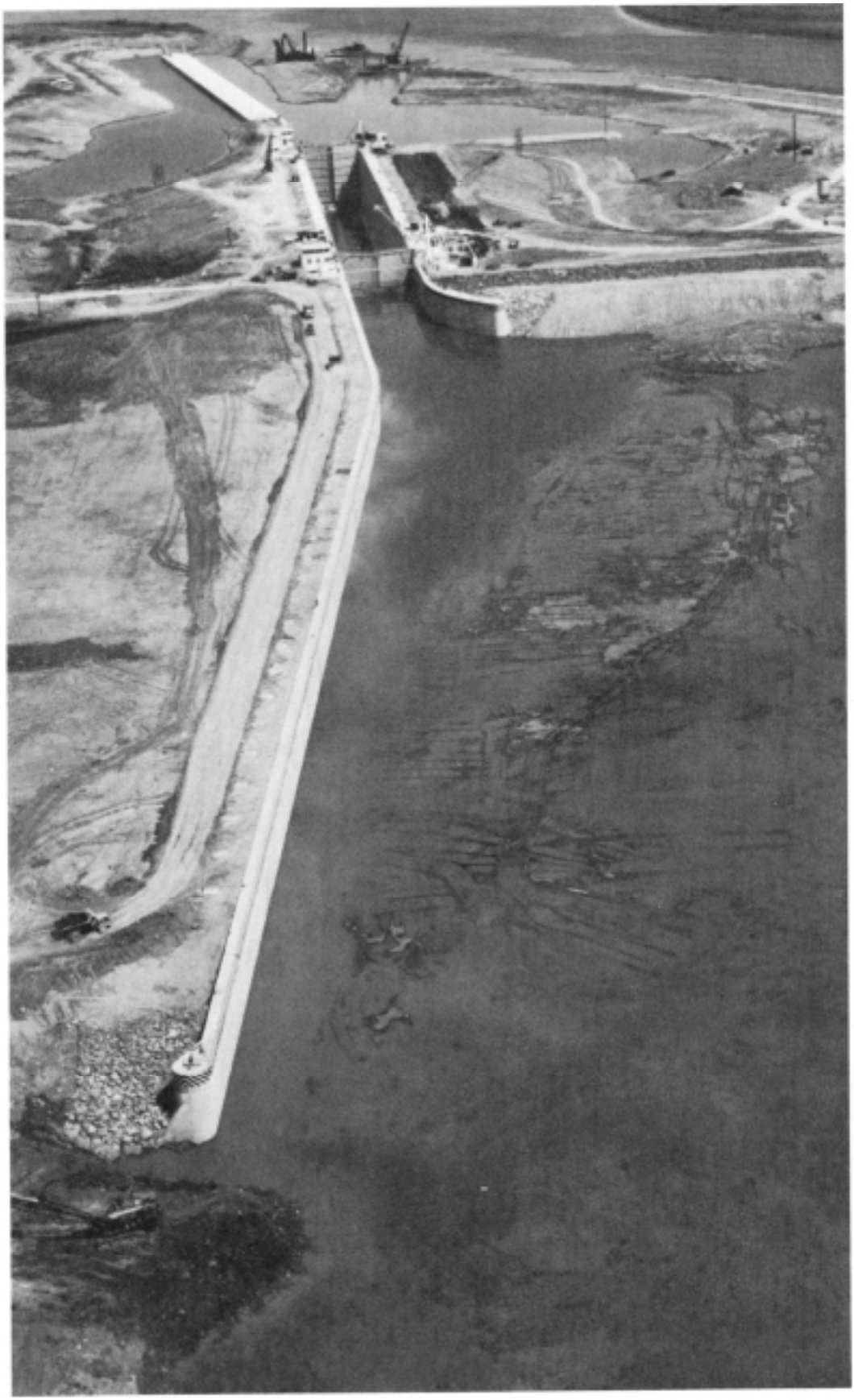
St. Lawrence Sea way Development Corporation



Construction of forms for placing concrete, May 1957.



The nearly completed Snell Lock, September 1957. The hugh gantry crane is dwarfed by the lock chamber. Construction activity continued around the clock.



Removing the plugs, May 1958.